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ADVANCING GRAPHITE PURIFICATION PROCESSES FOR APPLICATION IN LI-ION BATTERIES

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ABSTRACT

Natural graphite is the dominant raw material for the commercial lithium-ion anode cell manufacturing. Following mining, ore beneficiation through flotation, milling and spheronization, purification of the natural graphite is required to achieve >99.95% fixed carbon content with minimum metallic and mineral impurities. Currently the hydrofluoric acid process is the preferred purification process used in China. However, the process carries a number of well understood environmental, occupational health and safety risks. The transition to clean energy requires a significant increase in the quantity and quality of purified graphite. There are a number of technologies such as thermal purification, leaching and roasting that provide attractive alternative purification routes, some of which have been or are being considered for commercialisation and are at different stages of technology maturity. The paper evaluates the process efficiencies, intensities and value drivers for the different process routes and are compared to the patented EcoGra*f* HF*free*™ process technology. The patented purification technology is based on a multistep alkaline and acid dissolution process that eliminates the use of hydrofluoric acid. Multiple reagent recycling regimes have been identified. The study findings have been used to develop EcoGraf's implementation strategy of its purification technology in the battery manufacturing hubs in Australia, North American, Europe and Asia. EcoGraf's purification method technology is shown to be cost competitive, efficient, and sustainable for the lithium-ion battery market.

Keywords: Graphite, Purification, Roasting, Leaching, Fixed Carbon, Hydrofluoric Acid Milling, spheronization, Lithium Ion Battery, Anode